

- OCV General Arrangement SL01-NMN-XSS-DWG-3010-003
- OCV General Arrangement – Hull Layout SL01-NMN-XSS-DWG-3010-004
- OCV General Arrangement – Accommodation SL01-NMN-XSS-DWG-3010-005
- OCV SPE General Arrangement ITT Base Case Sheets 1 to 3 SL01-NMN-PSV-DWG-7015-005
- PSSV SPE General Arrangement Sheet 1 to 5 SL01-NMN-PSV-DWG-7015-003

All documents shall be in the English Language and metric system.

#### 1.4 PRINCIPAL PARTICULARS

Length overall (Mid hull)	:	227.00 m
Length B.P.	:	210.00 m
Breadth moulded	:	40.00 m
Depth moulded	:	18.20 m
Draft moulded (design)	:	13.20 m
Draft moulded (Scantling)	:	13.20 m
Deck camber (main deck)	:	NIL
Deck camber (forecastle deck)	:	NIL
Sheer forward (main deck)	:	NIL
Sheer aft (main deck)	:	NIL

Vessel deck dimensions and deck layout shall be capable of integrating and accommodating the following while satisfying the relevant stability and design criteria.

All seafloor production equipment and its integration including the various elements of SPE and including launch and recovery and operating systems, RALs, 3-off WROVs, DWP, Ore self loading, self unloading and offloading facilities, Ore Storage, export vessel and supply vessel and crew transfer Vessel Handling and mooring Arrangements and equipment, Workshops, Laboratories, Stores, Control Vans, Hydraulic Power Packs, electrical equipment, maintenance cranes and lifting equipment, Service Tools, Work Platforms and associated items of equipment as detailed in SCHEDULE K "SPE Integration Specifications".

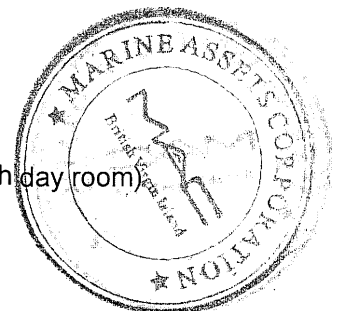
- Four (4) cargo holds for SMS ore. Capacity: approx. 5150 m<sup>3</sup>/hold provided cargo is level.
- Accommodation, Messing, Office and Laboratory facilities

#### Complement and Accommodation

For 150 Special Personnel (as defined in SPS 2008 Code):

67x 2-berth cabins	:	134 special personnel
16 x 1 berth cabins	:	16 special personnel (6 with day room)

For 30 Ship's Crew:



30 x 1 berth cabins (2 with day room)	:	30 crew
<b>Total Complement</b>	:	<b>180 persons</b>
		=====

**1.5 CAPACITIES**

SMS Ore Capacity (mass):	45,000 t (approx)
SMS Ore Capacity (volume):	4 holds x 5,150 m3 (approx)

Tank capacities shall be governed by the intervals between takings on bunkers.

The following tank capacities shall be provided to ensure a reserve capacity is available in case of system failures:

- Freshwater: 1500 m<sup>3</sup> approx.
- Seawater Makeup Tank: 500 m<sup>3</sup> (smooth walled tank)

NOTE: Fuel and oil tanks shall be double skin to reduce the risk of spillage should the outer hull be penetrated and are to have void spaces between tank top and main deck to allow welding on main deck without the need to drain, wash and de-gas fuel tanks.

Fuel tank capacity shall be sized to allow the OCV to perform normal seafloor production operations under calm sea conditions, without re-fuelling or taking on any liquids for a period of no less than 12 weeks.

With tanks 100% full, the approx. capacities will be as follows:

Freshwater, total	:	1500 m <sup>3</sup> (approx)
Fuel Oil (MDO/MGO), total	:	10500 m <sup>3</sup> (approx)
Water ballast	:	40000 m <sup>3</sup> (approx)



Note: Water ballast to be maximised to ensure freeboard of approximately 5m can be maintained during SPE operations (some ore is expected to be on board to allow this)

RALS SW Make-up Tank	:	500 m <sup>3</sup> (approx)
SPE Slops Tank (bund water and ore hold bilge water)	:	500 m <sup>3</sup>

**1.6 CLASSIFICATION**

The vessel is to be registered as a Production Support Silo Vessel and is to be constructed, machinery installed and equipment and spare gear provided in accordance with the Rules and Regulations of ABS hereinafter referred to as "Classification" for unrestricted international voyages and to their special survey to hull and machinery with notation:



+ D (E) OFFSHORE SUPPORT VESSEL SPS, MLC-ACCOM, HAB++ (WB), HELIDK (with Certificate of Compliance in respect of UKOOA CAP 437, NORSOK C-004 standards), CPS, HDC (Exposed Main Deck, 10 t/m<sup>2</sup>),

+ AMS, + ACCU, DPS - 2 EHS - F, UWILD, NBLES

Vessel shall be classified in accordance with the following classification society: American Bureau of Shipping.

Classification shall cover the hull, machinery, accommodation and all ship systems and parts of the SPE as required by class; for example; heavy equipment foundations, ships electrical system protection, etc.

The Vessel shall be built for in water survey of ships bottom and related items to allow the vessel to remain on site for up to 5 years and is to have Flag State approval for this.

## 1.7 REGISTRY

The OWNER shall register the vessel at his own cost under the Flag of Singapore. The OWNER & CHARTERER shall be furnished with all relevant documents from the classification and statutory authority as required in this specification to enable the OWNER to register the vessel under the Flag of Singapore.

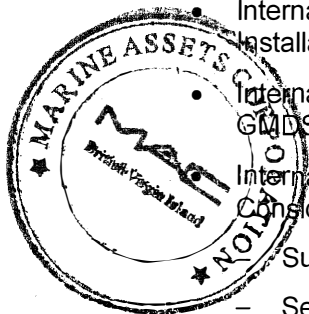
## 1.8 RULES AND REGULATIONS

The Vessel shall be constructed and outfitted so that it will in all respects comply with the latest rules, regulations and amendments applicable to a vessel of this type and size and in force at time of contract signing, in particular the following:

New Rules or amendments which are known and advised by the classification society at date of Contract signing to become effective up to 6 years after the contract signing will be listed and mutually agreed for compliance with adjustments in cost and delivery time.

- Rules and Regulations of the Port of Registry
- Rules and Regulations of the Classification Society
- Safety of Life at Sea SOLAS 1974, Consolidated Edition 2010
- International Convention on Tonnage Measurement of Ships, 1969
- International Convention on Load Lines, 1966 with the Protocol of 1988 and all amendments thereto.
- International Convention for the Prevention of Pollution from Ships (MARPOL), 1973, 1978 Annex's 1 to V1
- International Conference on Revision of the International Regulation for preventing Collisions at Sea (COLREGS) 1972 and amendments
- International Live-Saving Appliance Code (LSA Code)
- International Code for Fire Safety Systems (FSS Code)
- International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS) 2003
- IMO regulation and recommendation on the carriage of dangerous cargoes and amendments SOLAS 2002 Chapter 2-2 part G special requirements, regulation 19 carriage of dangerous goods.
- IMO Performance Standard for Protective Coatings (PSPC) for water ballast tanks (revised SOLAS II-1, Reg. 3-2)
- IMO Res. MSC.137(76) Standards for ship manoeuvrability
- IMO Res. A.601(15) Provision and Display of Manoeuvring information on Board Ships 1987

- IMO Res. MSC.337(91), "Code of Noise Level onboard Ships
- IMO Res. MEPC.107(49) "Revised guidelines and specifications for pollution prevention equipment for machinery space bilges of ships
- IMO Res. A.686(17) Codes and Alarms indicators
- IMO COLREG Requirement for Navigation Lighting new performance standard MSC.253(83)
- Japan Maritime traffic regulation
- Navigation (orders) Regulation of Commonwealth of Australia
- Australian Maritime Safety Authority Marine Orders part 32 Cargo Handling Equipment, Issue 2 – Amendment
- Documents as required by Government of vessel's Flag
- International Convention for the Control and Management of Ship's Ballast Water and Sediments (IMO, 2004)
- Special Purpose Ships 2008 code.
- Standard Specification of the International Maritime Satellite Communication System for Ships and INMARSAT Regulations
- ISO 6954-1984 (E) "Guideline for Overall Evaluation of Vibration in Merchant Ships"
- ISO 8861 Engine room ventilation in diesel-engined ships
- ISO 2923: 1996, Acoustics – Measurement of noise on board vessels
- ISO 14726 Ships and marine technology – identification of colours for the content of piping systems
- ISO International Telecommunication Convention 1973 and Radio Conference (1979 WARC) and Radio Regulations, 1982, Amendment 1st February,
- 1992 Global Maritime Distress And Safety System; ITU Radio Regulations 1997
- AS1657 Fixed Platforms, Walkways, stairways and ladders - Design, construction and installation
- MLC2006 Regulation
- USCG for Foreign Flag Vessels entering US waters (Fuel oil vents and bunkering stations with save-alls)
- CAA Rules CAP 437
- IMO Res A.855 (20) Standards for On-Board Helicopter Facilities
- International Electro Technical Commission (IEC) Publication 92 - Electrical installations in ships
- International Telecommunication Convention with latest amendments, including for GMDSS Areas A1 + A2 + A3.
- International Ship and Port Facility Security (ISPS) Code and SOLAS Ch.XI Consideration for the basic requirements for:
  - Sufficient Outside illumination
  - Security & Locking of Outside doors



- Ship Security Alert System
- MSC / CIRCULAR 645 Guidelines to Vessels with Dynamic Positioning System.
- IACS standards are to be followed as applicable

### 1.8.1 PNG REGULATIONS

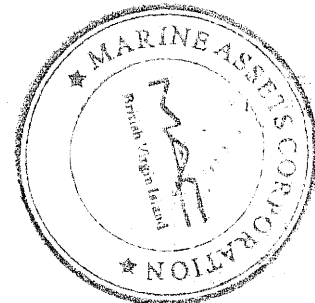
- National Maritime Safety Authority Act (2003)
- Merchant Shipping Act (1975)
- Dumping of Wastes at Sea Act 1979 – places restrictions on the dumping of wastes at sea
- Prevention of Pollution at Sea Act 1979 (Chapter 369) – provides standard offshore operating requirements
- New Bill and Regulations: Marine Pollution (Ships and Installations) Bill and Regulations – designed to regulate all forms of marine pollution from ships and offshore installations, and implements the MARPOL Convention and Anti-Fouling Systems Convention. This Bill is designed to repeal the Dumping of Wastes at Sea Act 1979
- New Bill and Regulations: Marine Pollution (Sea Dumping Bill and Regulations) – designed to regulate the dumping of wastes at sea and implements the London Dumping Protocol
- New Bill and Regulations: Marine Pollution (Ballast Water Control) Bill and Regulations
- New Bill and Regulations: Marine Pollution (Preparedness and Response) Bill and Regulations
- Small Craft Bill 2010 (with Amendments) June 2011

### 1.8.2 ENVIRONMENTAL IMPACT STATEMENT (EIS)

The Environmental Impact Statement (EIS) outlines the environmental commitments made by CHARTERER and the conditions in the Solwara 1 Environmental Permit that must be complied with. BUILDER is to be proactive and focus on ways of reducing green house gasses and harmful air emissions, as well as environmental pollution that may result from spills and discharges during vessel operations. Specific requirements to be discussed during the detailed design phase and as outlined in the Technical Note titled SL01-NMN-ENV-TNO-0180-003 Vessel Specification Environmental Considerations, BMS-NMI-ENV-TSD-0000-001 - Environmental Technical Standard, and SL01-NSG-ENV-GDL-0180-001 - Environmental Basis of Design. The EIS, the Solwara 1 Environmental Permit and the three preceding mentioned documents have been made available to the BUILDER as separate documents..

The technical note referenced above addresses particular areas of interest being:

- Air quality and emissions, including:
  - Engines and engine exhausts
  - Shipboard incinerators
- Energy Efficiency:
  - Vessel lighting
  - Power generation
- Vessel discharges:



- Sewage and Grey Water Treatment and Discharge
- Cooling / Thermal Water Discharge
- Acid management in vessel holds
- Deck spill prevention/bunding
- Underwater Noise and Vibration
- Ballast water management
- Biofouling management
- Emergency preparedness.

Further the items are discussed individually in subsequent, including the following relevant information:

- Legislative requirements
- Performance criteria
- Studies required
- Inputs required from the Contractor
- Study outputs and potential impacts to Contractor.

CHARTERER shall provide an Environmental Basis of Design (SL01-NSG-ENV-GDL-0180-001) to ensure build is in compliance with EIS undertakings.

As a result of these requirements the OWNER and CHARTERER is required to approve and agree to equipment purchases before it is procured by the shipyard to ensure the requirements of the EIS are met.

### 1.8.3 OTHER RULES AND STANDARDS

Other codes, rules and standards that shall be observed and complied with:

- DNV Standard for Certification of Lifting Appliances No. 2.22, October 2011 (The Launch and Recovery System for SPT's with all associated equipment and fittings are supplied with DNV certification and shall require load testing on board in accordance with same)
- DNV# standards for Lifting Appliances (The 200t Subsea Crane, 100t Ship to Ship Crane, 2 x 20t Knuckle boom on deck cranes, lifting gear for ships maintenance, lifting gear for SPE maintenance are to be supplied with DNV# certification and shall require load testing on board in accordance with same). (# ; or another IACS member subject to OWNERs approval)
- DNV, AISC Standards for Structural Steel buildings (The Dewatering plant shall be supplied in compliance with these standards with design verification, inspection and certification by a reputed third party approved by the CHARTERER)

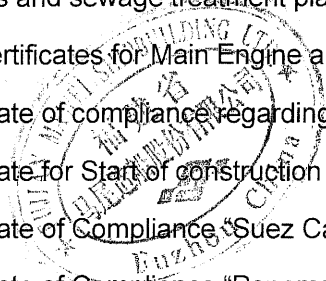
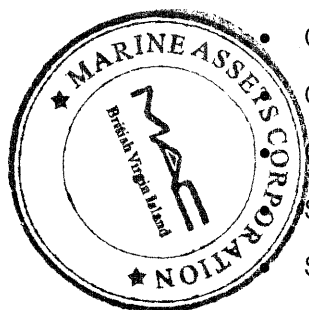
- API Offshore Structures Standards (The Derrick with all associated equipment and fittings & Substructure, the gantry and the riser system shall be supplied in compliance with these standards with design verification, inspection and certification by a reputed third party approved by the CHARTERER)
- Recommendations of IACS are to be observed
- GMDSS Regulations Area A1 + A2 + A 3
- Publication 92: Electrical Installation for Ships (IEC)
- BS 8450 Code for practice for installation of electrical and electronic equipment in ships
- Suez Canal Rules of Navigation
- European Pilot Association recommendations
- DIN/ JIS/ ISO Standards
- Shipbuilding Standard of IACS
- Guidelines for preparation of cargo securing manual, incl. OSHA rules
- Helideck – UKOOA CAP 437, NORSOK C-004
- UNCLOS (relevant to PNG)
- Design for the electrical systems onboard the vessel should comply with the requirements of the Electrical Power Generation and Distribution Philosophy document SL01-NSG-XTO-STD-3505-005 and the referenced codes contained within.
- IMCA Guideline SEL 025 Rev. 1, IMCA M 292 Rev 1, June 2014, Guidance on the Transfer of Personnel to and from Offshore Vessels and Structures

## 1.9 CERTIFICATES

The following certificates shall be obtained at BUILDER's expenses and supplied to the OWNER and CHARTERER at the time of delivery of the Vessel:

- Classification Certificate – Interim Provisional
- International Tonnage Certificate
- Cargo Ship Safety Equipment Certificate
- Cargo Ship Safety Construction Certificate
- Cargo Ship Safety Radio Certificate
- Radio License
- Helideck Inspection Certificate to UKOOA CAP 437, NORSOK C-004
- International Ship Security Certificate
- International Oil Pollution Prevention Certificate
- International Air Pollution Prevention Certificate

- International Sewage Pollution Prevention Certificate
- International Anti-Fouling System Certificate
- Engine International Air Pollution Prevention Certificate
- IMO Type Approval Certificate for each incinerator
- IMO Type Approval Certificate for Ballast Water Treatment System
- Builder's Certificate
- International Load Line certificate
- Certificate of Anchors, Cables and Hawsers
- Certificate of Lights and Life Saving Appliances
- Calibration Sheet of Magnetic Compass
- Fumigation Certificate
- Safety Radio Telephony Certificate
- ABS DPS-2 EHS-F Certificate
- ILO/ MLC certificates
- Cargo gear booklet
- Drinking water certificate
- NOx tech files
- Cargo securing manual
- Asbestos free certification (by recognised Third Party)
- All Equipment and Outfit Certificates or Makers Approvals, if applicable.
- Any other Certificate or certificates required for a vessel of this class, size and function.
- Test Certificate of anchor, chains, cables, hawsers, mooring ropes, castings, forgings and sewage treatment plant etc.
- NOx certificates for Main Engine and Aux. Engines
- Certificate of compliance regarding USCG foreign flag vessels entering US waters
- Certificate for Start of construction Keel Laid
- Certificate of Compliance "Suez Canal"
- Certificate of Compliance "Panama Canal"
- Sailing Permit
- Shipboard Oil Pollution Emergency Plan (SOPEP) – by OWNER
- Suez Canal Tonnage Certificate





- Ship Sanitation Control Certificate
- Dispensary Certificate
- Stability booklets and Inclining Test Reports or Lightweight Survey Reports approved by class. society
- Survey Reports from class. society for Hull and Machinery
- Letter of compliance to MARPOL Annex IV
- Certificate of Marine Equipment
- Deadweight certificate
- Certificate for navigation/explosion light issued by class
- Certificate for fire fighting appliances issued by class
- Test certificate for mooring ropes issued by the maker
- Lifting equipment load test certificates

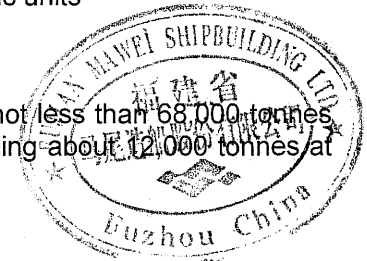
Should any of such certificates not be available by the time of delivery the BUILDER shall furnish such temporary certificates as serve the OWNER's needs until the permanent certificates are obtained within two months from delivery time.

All requested vessel plans, certificates, documents and calculations will be made available to OWNERS free of charge.

All delivery documentation will be in English language and metric units

### 1.10 DEADWEIGHT

The vessel is to be capable of carrying a total deadweight of not less than 68,000 tonnes (including the SPE, SPT and other production equipment totalling about 12,000 tonnes at 7.5m VCG above the main deck) at the design draft.

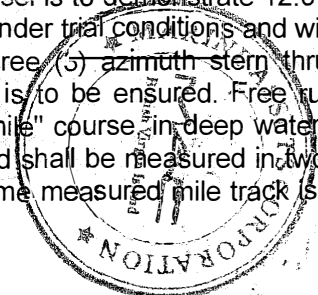


### 1.11 ENDURANCE

The vessel shall have sufficient fuel to allow the OCV to perform normal seafloor production operations under calm sea conditions, without re-fuelling or taking on any liquids for a period of no less than 12 weeks.

### 1.12 SPEED

Speed to be assessed during performance trials. The vessel is to demonstrate 12.0 knots speed with vessel loaded to a mean ballast draft of 9.2M under trial conditions and wind up to Beaufort 2. Free running trials shall be done with three (3) azimuth stern thrusters running. During the trials, adequate propeller immersion is to be ensured. Free running speed shall be measured over an approved "measured mile" course in deep waters and wind conditions not exceeding Beaufort 2 condition. Speed shall be measured in two runs in opposite directions - a matching return run over the same measured mile track is to be completed. The two-way results shall be averaged.



### 1.13 ENVIRONMENTAL CONDITIONS

The vessel, machinery and equipment shall be capable of working with no detrimental effect to operations in all conditions detailed in the Final Metocean Design Criteria Study

for Solwara 1 Location in the Bismarck Sea and the following prevailing environmental conditions:

Ambient air temperature	:	38°C (Normal), -19 deg C (min)
Relative humidity	:	80%
Sea water temperature	:	25°C to 32°C (Normal), 0°C (min)
Air Pressure	:	1032 mm bar

#### 1.14 OPERATING CONDITIONS AT SEA

The vessel when fitted with SPE shall be capable of conducting production operations in the following max sea conditions. For specific requirements in respect of vessel's DP capability to hold Position and Heading are given in detail in Clause 8.2:

BISMARCK SEA CONDITIONS (Non-Cyclonic):

Condition Description	Current -5m (m/s) / (kn)	Wind 1min (m/s) / (kn)	Wave Hs (m)	Tz (s)	Alpha	gamma
OPERATIONS 2m Hs, +/-360deg, DP circle +/-5m, RTP connected and system operating.	0.56 / 1.1	11.2 / 21.8	2.0	4.1	0.007	1.04
OPERATIONS 2mHs, +/-15deg, DP circle +/-5m, RTP connected and system operating Bulk Carrier Vessel moored alongside.	0.56 / 1.1	11.2 / 21.8	2.0	4.1	0.007	1.04
OPERATIONS 1yr RP, +/-30deg, DP circle +/-5m, RTP connected and system operating	0.8 / 1.6	16.4 / 31.9	3.1	5.8	0.007	1.04
STANDBY 10yr RP, +/-15deg, DP circle +/-10m, RTP connected and system on standby	1.1 / 2.1	20.7 / 40.3	4.4	6.8	0.0109	1.62
SURVIVAL 50yr RP, +/-10deg, DP circle +/-35m, RTP disconnected	1.2 / 2.3	23.4 / 45.4	5.25	7.4	0.0111	1.66

Technical Specifications for 227m OFFSHORE CONSTRUCTION VESSEL

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For Metocean Data refer to APPENDIX B – METOCEAN DATA

#### Tonga North East Conditions (Non-Cyclonic)

Condition	Current -5m (m/s) / (kn)	Wind 1min (m/s) / (kn)	Wave Hs (m)	Tz (s)	alpha	gamma
OPERATIONS 1yr RP, +/-30deg	0.69 / 1.34	15.2 / 29.5	4.0	6.6	0.0123	1.9023
STANDBY 10yr RP, +/-15 deg	0.82 / 1.6	20.1 / 39.0	4.9	7.1	0.0132	2.0854
SURVIVAL 50yr RP, +/-10 deg	0.95 / 1.85	23.7 / 46	5.9	7.8	0.0127	1.9830

It is assumed that the riser will be recovered and the vessel will depart the operation area in the event of a cyclone forecast. For Metocean Data refer to APPENDIX B – METOCEAN DATA

#### Tonga South West Conditions (Non-Cyclonic)

Condition	Current -5m (m/s) / (kn)	Wind 1min (m/s) / (kn)	Wave Hs (m)	Tz (s)	alpha	gamma
OPERATIONS 1yr RP, +/-30 deg	0.60 / 1.17	17.5 / 34	4.8	7.5	0.0106	1.5669
STANDBY 10yr RP, +/-15 deg	0.80 / 1.56	21.5 / 41.8	5.7	8.1	0.0106	1.57
SURVIVAL 50yr, +/-10 deg	0.94 / 1.83	24.3 / 47.2	6.2	8.5	0.0101	1.4753

It is assumed that the riser will be recovered and the vessel will depart the operation area in the event of a cyclone forecast. For Metocean Data refer to APPENDIX B – METOCEAN DATA